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NEWAL—A Promising New Smooth-Awned Variety of Barley for Alberta

BY

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INTRODUCTION

The cereal crops produced in Canada may be listed in order of their importance as shown by total production, as wheat, oats, barley and rye. The following data, taken from a statistical treatise on barley issued by the Agricultural Branch of the Dominion Bureau of Statistics*, show the relative position of barley as a cereal crop in Canada for 1932:

	Acreage		Production		
	Number	Per cent	Bushels	Tons	Per cent
Wheat	27,182,100	60.6	428,514,000	12,855,400	59.2
Oats	13,148,400	29.3	391,561,000	6,656,500	30.7
Barley	3,757,600	8.4	80,773,000	1,938,500	8.9
Rye	773,800	1.7	8,938,000	250,300	1.2

It will be seen that of the total acreage sown to the four leading cereal crops, 8.4% was sown to barley. Production in terms of the tonnage basis showed barley to constitute 8.9% of the total. In 1929, when barley acreage was at its maximum, 13.3% of the total acreage sown to cereals consisted of barley. For the same year the production of barley amounted to 14.6% of the cereal tonnage produced.

The largest part of the Canadian barley crop is produced in the three prairie provinces of Alberta, Saskatchewan and Manitoba. Of the 80,773,000 bushels produced in Canada in 1932, 63,114,000 bushels were produced in the Prairie Provinces. The comparative acreages of barley sown in each of the prairie provinces for the years 1927-1932 are as follows:

	Manitoba (acres)	Saskatchewan (acres)	Alberta (acres)
1927	1,512,457	925,889	400,000
1928	1,937,263	1,621,463	545,524
1929	2,181,895	2,228,604	703,704
1930	1,991,000	2,016,000	748,000
1931	1,112,863	1,336,092	723,772
1932	1,123,300	1,329,500	701,300

*The data presented in this section is taken largely from this publication.

It will be noted that a sharp decline in the acreage sown to barley occurred in 1930 and subsequent years, in both Manitoba and Saskatchewan. The acreage sown in Alberta, on the other hand, continued to increase in 1930, and has been maintained in 1931 and 1932. The present trend is toward increased acreages sown to barley.

The exports of barley for the 12-year period, 1920-21 to 1931-32, amounted to 24% of the total production. The actual industrial demand for barley for milling and malting purposes has averaged from 18-20 million bushels annually since 1926, or approximately 20-25% of the total production. From this it may be seen that from 50-55% of the barley produced in Canada has found its way either into the feed lots, or has gone into year-end stocks.

Of the barley inspections made in western Canada during 1930-31, 86.1% graded under the feed barley classification, i.e., any one of 3 C.W., 4 C.W., 5 C.W., and 6 C.W. grades. In 1931-32, 70.8% of the inspections were placed in these grades. Inspections grading as six-rowed malting barley amounted to 7.5% and 16.3% of the total inspections in 1930-31 and 1931-32 respectively. These figures indicate that western Canada is primarily interested in the production of feed barley.

The Feeding Value of Barley

There is a large potential market in eastern Canada for western feed barley. Unfortunately this barley has to compete with corn supplies imported from the United States and Africa. It has been estimated that the annual imports of corn into Canada from this source, for the past few years, have been over 14,000,000 bushels, a large part of which is used for stock feeding. Against this some 40,000,000 bushels of barley are exported. Present trends indicate that this import of corn is increasing yearly. In view of the large export of barley, together with the present trend, owing to low price levels, of utilizing more of the home grown barley and other coarse grain in the feed lots, it is evident that imported corn is competing directly with native barley. The question naturally arises whether or not barley could replace much of this corn in the feed lot. The most important use of barley today is as a feed for livestock. Barley has long been used as a feed grain in Europe, in parts of Asia, in the United States, and in Canada. In Canada this grain has been used primarily as a feed for beef cattle and hogs. Recently more attention has been paid to its value in the feeding of dairy cattle, horses and sheep. Feeding tests generally have shown that barley is undoubtedly the best alternative to corn as a feed for fatten-

ing animals. The following analysis of four of the principal feed cereals is taken from Pamphlet 127, published by the Dominion Department of Agriculture, Ottawa:

Grain	Water	Ash	Crude protein	Fibre	Extract	Fat	T.D.N.*
	%	%	%	%	%	%	%
Barley	9.3	2.7	11.5	4.6	69.8	2.1	79.4
Corn	10.5	1.5	10.1	2.0	70.9	5.0	85.7
Oats	9.2	3.5	12.4	10.9	59.6	4.4	70.4
Wheat	10.2	1.9	12.4	2.2	71.2	2.1	80.1

*Total digestible nutrients per 100 pounds.

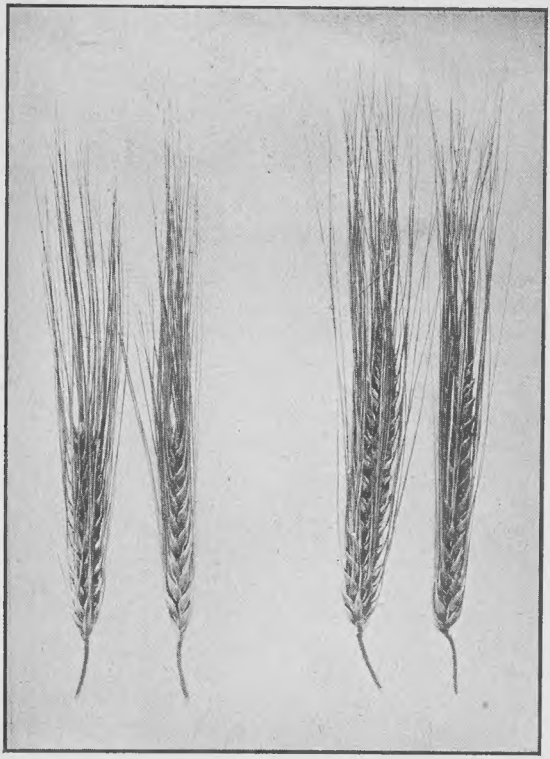
The foregoing analyses show barley to be well up in protein, to be low in fibre for a grain carrying a hull, and to be relatively high in fats and carbohydrates. In total digestible nutrients it is distinctly superior to oats, approximately equivalent to wheat, and but slightly inferior to corn. The above report also states that barley rolled, cracked or coarsely ground, combines well with oats in the fattening of lambs.

Recently the Canadian National Research Council has published a report* giving a review and analysis of the comparative feeding values of barley, oats, wheat, rye and corn. This summary showed barley to be the equivalent of either oats or corn in the feeding of dairy cattle, and to be possibly superior to these grains in the fattening of beef cattle. Barley was approximately 5% less efficient than corn for finishing hogs, but was distinctly superior to oats in this regard. As a feed for work horses, crushed barley appeared to be more nutritious than oats, and when fed in grain mixtures up to 25%, increased the feeding value of the mixture without detracting from its palatability.

Origin of Newal Barley

Newal was developed at the University of Alberta, from a cross made in 1919 between a white, six-rowed, smooth-awned selection obtained from the Minnesota Agricultural Experiment Station, and the well known six-rowed, rough-awned variety O.A.C. No. 21. The smooth-awned selection was, in turn, obtained from a cross between Manchuria, a white, six-rowed, rough-awned variety, and Lion, a black, six-rowed, smooth-awned variety introduced into the United States from Russia in 1913. It is interesting to note that Lion was one of the original smooth-awned selections imported into America for purposes of initiating smooth-awn breeding programs.

*CRAMPTON, E. W. The comparative feeding values for livestock of barley, oats, wheat, rye and corn. Report No. 28, National Research Council of Canada, Ottawa.



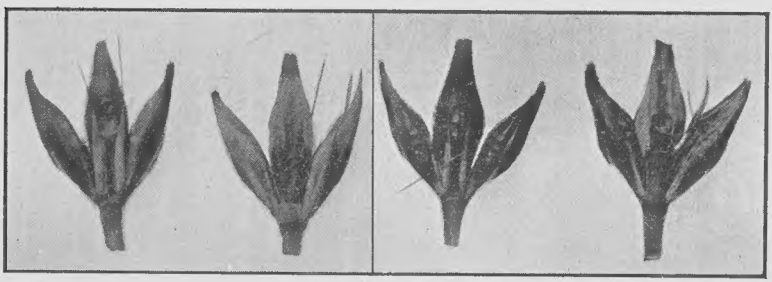


Figure 1.—Showing the head and kernel characters of Trebi (left) and Newal (right) barleys.

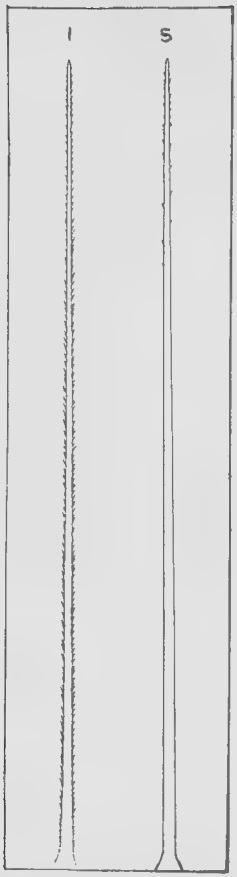


Figure 2.—A diagrammatic representation of the degree of barbing of awn of Trebi (left) and Newal (right). NOTE that Newal possesses only a few fine barbs at the tip of the awn.

Description of Newal Barley

Newal is a white, six-rowed, hulled variety possessing a spike of medium density, the upper lateral spikelets of which do not overlap to the same extent as those of O.A.C. No. 21 (see Figure 1). The awns are smooth, except for fine barbs at the tips, which sometimes extend along one-third of their length (see Figure 2). The aleurone (portion of kernel immediately underneath the hull) is white in color. In common with the majority of smooth-awned varieties the rachilla (portion of the stem to which the kernels are attached) is beset with long straight hairs. The kernels are characteris-

tically plump which gives the variety a high weight per bushel. The straw is relatively strong and of medium height. The variety is mid-season with regard to earliness of maturity. Newal has a heavy foliage with broad leaves that makes it a vigorous competitor against weeds.

A comparison of the head and spikelet characteristics of Newal and Trebi is shown in Figure 1.

Experimental Data

Agronomic data pertaining to Newal have been compiled with regard to yield, earliness, strength of straw, height, weight per bushel and disease reaction. Each of these characters will be discussed in detail. For purposes of comparison data will be included for six of the more popular smooth-awned varieties grown at the present time, and three of the recommended rough-awned varieties for Alberta. Comfort, Glabron, Velvet, Regal and Wisconsin Barbless No. 38 are six-rowed, smooth-awned varieties; while Spartan is smooth-awned and two-rowed. O.A.C. No. 21, Trebi and Canadian Thorpe are rough-awned varieties, the first two named being six-rowed and the last one two-rowed.

Yield.

In Table I are summarized the available yield data for the five-year period, 1930-34. Yields are expressed as bushels per acre. In addition, both the four-year and five-year averages have been expressed as a percentage of O.A.C. No. 21. Newal shows the highest average yield of the smooth-awned varieties tested, and outyields O.A.C. No. 21 by 8% for the five-year average. Comfort and Regal rank slightly lower than O.A.C. No. 21, yielding on the four-year average (1930-33) 97% and 95% of the latter respectively. Glabron, Velvet and Spartan are distinctly inferior in yielding capacity to O.A.C. No. 21. Spartan yielded several bushels less than the rough-awned Canadian Thorpe. For the 1932-33 period, Wisconsin Barbless No. 38 appears to rank with Comfort and Regal in yielding capacity.

Owing to the popularity of the smooth-awned type of barley and the demand for definite information regarding suitability to various parts of the country, arrangements were made by the Cereal Division of the Central Experimental Farm Ottawa, and the National Barley Committee, in the spring of 1934, for a co-operative barley nursery to test the smooth-awned barley varieties together with a few of the standard rough-awned sorts. In Table II is given a summary of the data obtained from the Co-operative Smooth-awn Nursery grown at Edmonton in 1934.

TABLE I.

Comparative yearly (1930-34) and average yields of Newal barley and of certain other rough- and smooth-awned varieties when grown at the University of Alberta, Edmonton.

Variety	Yield in bushels per acre								
	1930	1931	1932	1933	1934	4-year average 1930-1933	4-year aver. in % of O.A.C. No. 21	5-year average 1930-1934	5-year aver. in % of O.A.C. No. 21
O.A.C. No. 21	36.5	56.8	50.5	44.7	66.5	47.1	100	51.0	100
Trebi	32.7	54.9	59.1	37.5	78.0	46.0	98	52.2	102
Canadian Thorpe	11.0	50.0	44.5	34.8	40.0	35.1	75	36.1	71
Comfort	35.8	52.4	47.4	47.1	.....	45.7	97	.....	.....
Glabron	29.0	49.3	43.4	39.5	52.0	40.3	86	42.6	84
Newal	43.5	63.9	53.2	40.7	73.5	50.3	107	55.0	108
Regal	34.7	54.9	46.6	42 9	67.5	44.8	95	49.3	97
Spartan	22.5	43.9	33.4	31.5	49.0	32.8	70	36.1	71
Velvet	22.0	52.4	41.3	42.9	.....	39.7	84	.....	71
Wisconsin Barbless No. 38	.....	.....	48.9	41.5	.....	.....	.....	.....	.....

With regard to yield it will be seen that Newal ranked highest of all the varieties under test. It exceeded the rough-awned varieties O.A.C. No. 21 and Trebi by 18 bushels and 6 bushels, respectively. Regal, the second-ranking, smooth-awned variety produced 15 bushels less than Newal.

In 1934 a large plot was sown to Newal barley on the University Farm at Edmonton, in order to increase the seed for distribution to farmers. The average yield per acre on this field was 82 bushels.

TABLE II

Summary of data from the Cooperative Smooth Awn Barley Nursery grown by the University of Alberta at Edmonton, 1934.

Variety	Growth period in days	Per cent lodged	Height in inches	Weight per bushel	Yield in bus. per acre
Brandon 1099	90	29	45	49.5	66.5
Brandon 2131	90	11	46	49.0	58.5
Comfort	90	16	49	45.5	56.5
Glabron	88	6	48	50.0	56.5
Hannchen	89	22	39	55.0	62.5
Newal	85	3	45	52.0	88.0
Nobarb	91	17	43	51.0	61.5
O.A.C. No. 21	86	10	48	48.0	70.0
Ott. 1014 E. 25	84	17	46	48.5	49.0
Regal	89	7	45	51.5	73.0
Sanalta	91	4	44	52.0	70.0
Sans Barb 2	87	19	45	48.5	71.5
Sans Barb 3	97	52	42	48.0	56.5
Trebi	87	14	41	45.5	82.0
Velvet	87	12	47	47.5	56.5
Wis. Ped. 38	90	21	47	47.5	60.0

Earliness of maturity.

Earliness of maturity is an important characteristic of any variety developed for northerly regions. It has an added significance in the case of barley since this grain is often

sown late as a cleaning crop. Newal appears to be quite satisfactory with regard to earliness of maturity, as determined by the average growth period for the five-year period 1930-34 (Table III). The data show this variety to be equal in growth period with Trebi and Regal, one day earlier than Glabron, and two days later than O.A.C. No. 21.

The summarized data from the Cooperative Smooth-awn Nursery (Table II) show Newal to be one day earlier than O.A.C. No. 21, 2 days earlier than Trebi and 3-4 days earlier than Glabron and Regal (Table II). These differences in maturity of Newal in relation to O.A.C. No. 21, in the two tests, is undoubtedly due to the fact that different strains of O.A.C. No. 21 were used as checks in the two experiments.

TABLE III.

Comparative yearly (1930-34) and average growth periods of Newal and of certain other rough- and swooth-awned varieties of barley, grown at the University of Alberta, Edmonton.

Variety	Growth period in days*								
	1930	1931	1932	1933	1934	4-year aver. 1930-33	No. of days + or — O.A.C. No. 21 4-year aver.	5-year aver. 1930-34	No. of days + or — O.A.C. No. 21 5-year aver.
O.A.C. No. 21	84	104	82	77	85	87	0	86	0
Trebi	85	109	84	77	87	89	+2	88	+2
Canadian Thorpe	93	106	89	85	97	93	+6	94	+8
Comfort	88	108	86	78	....	90	+3	....	....
Glabron	85	107	85	78	88	89	+2	89	+3
Newal	86	106	84	77	86	88	+1	88	+2
Regal	87	104	85	78	88	89	+2	88	+2
Spartan	80	105	86	77	90	87	0	88	+2
Velvet	85	105	85	78	....	88	+1	....	....
Wisconsin Barbless No. 38	2	....	85	82	....	....	....	....	....

*Growth period is the number of days from emergence to maturity.

Strength of straw.

Strength of straw is of great importance in a barley variety. Not only is the yield from a lodged field greatly reduced, but the difficulties of harvesting are increased. The data in Table IV show the comparative lodging of Newal and a number of other varieties for the four-year period 1931-34. Newal, in common with other smooth-awned varieties tested, shows a more desirable strength of straw than the rough-awned six-rowed varieties, O.A.C. No. 21 and Trebi.

The average lodging of Newal is 7%, as compared with 13% and 18% for O.A.C. No. 21 and Trebi respectively. In the Cooperative Nursery for 1934 Newal shows the least lodging of the varieties tested (Table II). In this experiment Newal shows 3% lodging as compared with 10% in the case

of O.A.C. No. 21 and 14% in the case of Trebi. A number of the other smooth-awned varieties tested, including Brandon 1099, Sans Barbs No. 3 and Wisconsin Pedigree No. 38, exhibited over 20% lodging.

TABLE IV.

Comparative yearly (1931-34 and average lodging of Newal and certain other rough- and smooth-awned varieties of barley grown at the University of Alberta, Edmonton.

Variety	Lodging in per cent.					
	1931	1932	1933	1934	Average 1931-33	Average 1931-34
O.A.C. No. 21	32	1	14	5	16	13
Trebi	52	1	5	14	19	18
Canadian Thorpe	0	1	0	0	0	1
Comfort	8	1	4	....	4	....
Glabron	14	0	2	6	5	6
Newal	19	0	2	5	7	7
Regal	22	0	1	8	8	8
Spartan	2	0	1	3	1	2
Velvet	19	1	4	....	8	....
Wisconsin Barbless No. 38	....	1	4	....	....	....

Height of plant.

Generally the length of straw of a barley variety is not considered an important character, provided it is not so short as to complicate harvesting. Since the straw of the smooth-awned barleys will, in all probability, be used to a greater extent as greenfeed than has been the case with rough-awned varieties, a good length of straw, consistent with good strength, would be a desirable feature. From the data given in Table II and V it is evident that Newal possesses a satisfactory length of straw. The length of straw of this variety is midway between that of O.A.C. No. 21 and Trebi.

TABLE V.

Comparative yearly (1930-34) and average heights of Newal, and of certain other rough- and smooth-awned barleys grown at the University of Alberta, Edmonton.

Variety	Height in inches								
	1930	1931	1932	1933	1934	4-year aver. 1930-33	No. of inches + or — O.A.C. No. 21 for 4-yr. av. 1930-33	5-year aver. 1930-34	No. of inches + or — O.A.C. No. 21 for 5-year av. 1930-34
O.A.C. No. 21	32	44	40	37	47	38	0	40	0
Trebi	32	41	31	26	41	33	—5	34	—6
Canadian Thorpe	28	48	44	30	43	38	0	39	—1
Comfort	30	42	40	34	....	37	—1	....	....
Glabron	32	44	44	34	50	38	0	41	+1
Newal	29	40	38	33	47	35	—3	37	—3
Regal	27	40	41	31	46	35	—3	37	—3
Spartan	32	42	38	31	43	36	—2	37	—3
Velvet	31	43	43	36	....	38	0	....	....
Wisconsin Barbless No. 38	....	....	41	35	....	....	....	....	....

Weight per bushel.

A high weight per bushel is a desirable characteristic of a barley variety, as it denotes plumpness of kernel and usually a low percentage of hull. Newal possesses an exceptionally high weight per bushel for a six-rowed variety (Table VI). On a four-year average (1931-34) Newal averaged 51 pounds per bushel as compared with 48.5 and 47.5 pounds shown by O.A.C. No. 21 and Trebi, respectively. It is of interest to note that Newal equalled Canadian Thorpe, a two-rowed variety, in this regard. Glabron and Regal both averaged 50 pounds per bushel, or 1 pound less than Newal.

The exceptionally high weight per bushel of Newal is again demonstrated by the results of the Cooperative Smooth Awn Nursery (Table II). In this test Newal possessed the highest weight per bushel of the six-rowed varieties.

One of the reasons why Trebi has been favored as a feed barley is because of its large kernel which greatly facilitates the cleaning out of wild oats from seed stocks. Newal also has a large kernel (see Figure 1) which will be of value on farms where wild oats are a common weed.

TABLE VI.

Comparative yearly (1930-34) and average weights per bushel of Newal and of certain other rough- and smooth-awned varieties of barley grown at the University of Alberta, Edmonton.

Variety	Pounds per bushel						
	1930	1931	1932	1933	1934	3-year average 1931-33	4-year average 1931-34
O.A.C. No. 21	54.0	47.5	52.5	46.5	46.8	49.0	48.5
Trebi	50.0	44.0	51.5	46.0	47.5	47.0	47.5
Canadian Thorpe	.....	53.0	54.0	47.0	50.5	51.5	51.0
Comfort	54.5	47.5	53.5	48.5	.....	49.5	.....
Glabron	54.0	47.0	52.5	49.0	51.0	49.5	50.0
Newal	54.5	48.0	54.0	50.5	51.0	51.0	51.0
Regal	52.5	47.0	53.5	48.5	50.5	49.5	50.0
Spartan	.....	52.5	54.0	51.5	52.0	52.5	52.5
Velvet	.....	48.5	51.5	47.5	.....	49.0	.....
Wisconsin Barbless No. 38	.....	.....	50.5	45.5	.....	.....	.....

Disease reaction.

Investigators have found that smooth-awned barley varieties are generally susceptible to the loose smut disease. Newal is no exception in this regard. It is important to remember that loose smut is not readily controlled by the simpler methods of seed treatment. The causal organism is not carried over from one season to another on the surface of the infected seeds, as in the case of that causing covered smut, but actually over-winters within the embryo of the mature kernel. Kernels thus infected cannot be distinguished from healthy ones.

Some growers have found that the loose smut disease of barley can be effectively controlled by growing a special seed plot in an isolated location, on clean, well prepared land, and rogueing, or pulling out, the smutty plants as soon as they appear. This is a very practical and successful method for the control of the loose smuts of either barley or wheat. The loose smut fungus infects the seeds at flowering time. Spores are produced on infested plants and are blown about by the wind just at heading time. Removal of the infested plants from the field as soon as they appear prevents infection of the new crop. Very careful rogueing then of the seed plot during the period of one or two weeks when the grain is heading, will help considerably to control this disease; and, if done thoroughly, it may be eradicated entirely.

The loose smut fungus being inside the kernel itself, is not affected by the usual surface disinfectants used in the control of covered smut. The modified hot water treatment is the seed treatment method recommended for controlling this disease. Details regarding the use of this treatment are given in the University of Alberta Circular No. 5, 1933, from which the following paragraphs are quoted:

"In the modified hot water treatment the grain is first soaked for 4 hours in water at room temperature. The purpose of this presoak is to stimulate the dormant mycelium of the loose smut organism inside of the seed into activity and thus render it more susceptible to the hot water to follow. The next procedure is to warm the seed before immersing it in the final hot water bath. This may be done by placing the grain in water at a temperature of 112°F. and holding it at this temperature for 15 to 20 minutes, or by immersing it for 1 minute in water at about 120°F. The grain is then removed from this bath and immersed for 10 minutes in the hot water bath which is maintained at a temperature of about 124°-127°F. During the time the grain is soaking in this bath the temperature of the water should not sink below 122°F. nor go above 129°F.

"Another hot water treatment, which does not involve the long presoak of the above method, consists in soaking the grain for 1 hour and 50 minutes in water at 118.5°F. or for 1 hour and 35 minutes at 120°F. This is known as the single-bath method."

"If sacks are used in treating with hot water they should only be half filled with grain and tied at the top. This will permit free circulation of the water and will allow for the swelling of the grain. When taking the sacks out of the hot water bath they should be allowed to drain and the grain

should then be spread out in a thin layer to dry. It should be raked occasionally with a wooden rake until it is dry enough to sow."

"It is necessary to use an accurate thermometer to determine the temperatures of the different water baths of the hot water treatment. The directions for treatment must be followed carefully. If they are not, the seed may be killed or the smut may not be controlled. Considerable seed injury is likely to result with this treatment even with the best of care. This, as well as the swollen condition of the grain, should be taken into consideration in adjusting the rate of seeding. After treatment, the grain should be stirred frequently with a rake or shovel so that it will dry rapidly and evenly. If the drying process is too prolonged, sprouting or moulding may occur. There is also danger of injury from freezing if the swollen grain is exposed to low temperatures."

As this method of treating seed is a tedious one, it should only be used in connection with a seed plot, enough seed being treated to sow a plot large enough to insure sufficient seed for the next years' planting. In view of the fact that the spores of the loose smut are wind-borne, care should be taken to locate the seed plot at some distance from other barley fields, to prevent reinfection.

Newal is also moderately susceptible to the covered smut disease. The hot water treatment used to control loose smut will also kill covered smut spores which may be present on the seed. When the hot water treatment has not been applied, then some dust, such as New Improved Ceresan, an organic mercury compound, should be used. Ceresan will also control another barley disease, known as "stripe." Newal has shown, however, considerable resistance to this latter disease.

Newal—a Feed Barley

From the agronomic data presented in the foregoing sections of this paper, it is apparent that Newal possesses a number of characteristics which are requisite to a good feed barley. Not the least important of these is the smooth-awn character. Rough awns have tended to limit the production of barley both through the added inconvenience they cause during harvesting and threshing operations, and through their injurious nature when the straw is fed to livestock.

The high yielding capacity of Newal, together with its exceptionally high weight per bushel, enhances the possibilities of the producer obtaining a high tonnage of feed per acre. Furthermore, the losses generally incurred from lodging will

tend to be minimized by the growing of Newal, which has been shown to possess a comparatively stronger straw than the present recommended varieties, O.A.C. No. 21 and Trebi. In addition, this variety is mid-season with regard to earliness of maturity and possesses a satisfactory length of straw.

Where Should Newal be Grown?

As Newal is essentially a feed barley it should be grown primarily in those areas where there is considerable local demand for feed grains. This would comprise roughly the diversified farming area of both west- and east-central Alberta, and the irrigation areas of southern Alberta. Newal may not be the most suitable barley for the gray or wooded soil areas. Such areas, owing to the low nitrogen content of their soils, and the comparatively high annual precipitation, are particularly well suited to the growing of a high-quality malting barley. It is important to point out in this connection that smooth-awned varieties, in general, have not been especially suitable for malting. The requirements of barley intended for malting purposes are low protein content and starchy texture. Feed barleys, on the other hand, should possess as high a protein content as possible, since feeding value would be enhanced by this factor. The black soil belt which comprises the greater part of the mixed or diversified farming area is high in nitrogen and produces a good yield of barley of relatively high protein content. Such barley is unsatisfactory to the maltster, but of considerable value to the livestock producer.

In view of the smaller yield per acre, and lower protein content of barley grown on wooded soils, it would appear that as far as possible the growers in such areas should be encouraged to produce malting barley, for which their conditions are particularly well suited. There will always be, however, a certain demand for feed barley in these areas. In case the barley is grown for feed only, Newal would be as satisfactory a variety as any to supply this need.

In the drier portions of the Province on the brown soils, and especially on irrigated land, barley is grown primarily for feed. Trebi is the most popular variety in this region because of its high yielding capacity and large kernel. It has a weak straw which is very short under dry conditions, and has a very rough awn. Newal barley should be more suitable since it is equal, or higher, in yield than Trebi, has a longer and much stronger straw, and has a smooth awn.

Growing Feed Barley for the Eastern Market

At the present time there is little demand for feed barley outside of the Province, owing to the high percentage of wild oats and other weed seeds in the barley being produced. The closing of the doors of the eastern market to western feed barley was due, primarily, to this factor. This ban has given rise to a situation in which large supplies of corn are being imported into eastern Canada from the United States and Africa, to take the place in the feed lot of the cheaper, but equally valuable, home-grown barley.

The dirty condition of western feed barley may be attributed largely to two factors: First, to the practice of growing barley as a cleaning crop, and, second, to the use of stubble land for growing barley, owing to the susceptibility of the crop lodging. It should be obvious that if an attempt is to be made to regain the eastern feed market, clean barley must be grown. This necessitates, not only the sowing of clean seed, but also the use of summer-fallowed land. The risks of lodging incurred by the use of summer-fallowed land have been reduced by the introduction of stiffer strawed varieties, as exemplified by Newal. With such varieties it should be possible to grow the crop on summer-fallowed land with little more lodging than formerly occurred with the weaker-strawed varieties when grown on stubble.

The judicious use of cleaning machinery would also aid in raising the quality of feed barley sent to the eastern Canadian market.

SUMMARY

From the viewpoint of total production, barley is the third ranking cereal crop in Canada. It is surpassed by wheat and oats. The greater part of this barley is produced in western Canada, where it is grown primarily for feeding purposes.

Owing to low price levels, there has been recently an increasing interest shown in the possibilities of utilizing more barley, and other coarse grains, in the livestock industry. Feeding experiments have shown barley to be highly valuable for the feeding of dairy cattle, and for the finishing of beef cattle and hogs for market purposes. Rolled, or cracked, barley has been found to form a valuable part of the grain ration of work horses and of market lambs.

Newal is a promising new smooth-awned variety developed at the University of Alberta. In varietal tests, Newal has consistently excelled in yield and weight per bushel the commonly

grown varieties. It not only surpassed the rough-awned varieties O.A.C. No. 21 and Trebi in these respects, but was distinctly superior to them in regard to strength of straw. Newal is mid-season in maturity and possesses a satisfactory length of straw. The heavy foliage and broad leaves should assist weed control.

In view of its smooth awn, high yielding capacity and high weight per bushel, Newal should prove valuable as a feed barley, and as such should tend to displace a number of the rough-awned varieties now grown.

Newal is recommended primarily for the diversified farming areas within the black soil belt, and for the irrigated areas of southern Alberta, where its relatively strong straw should make it especially desirable.

Owing to the susceptibility of smooth-awned barleys to loose smut, the usual control measures should be used. Consideration should be given to clean seed, rogueing, and treatment by the hot-water method prior to seeding. Rogueing and the hot-water treatment give best results when used in conjunction with a seed plot.

There is little demand at present in eastern Canada for western-grown feed barley, due to the dirty condition of the grain. To compete actively for this market means the production of clean barley. This in turn involves the use of clean seed, summer-fallowed land, and intelligent use of cleaning machinery.